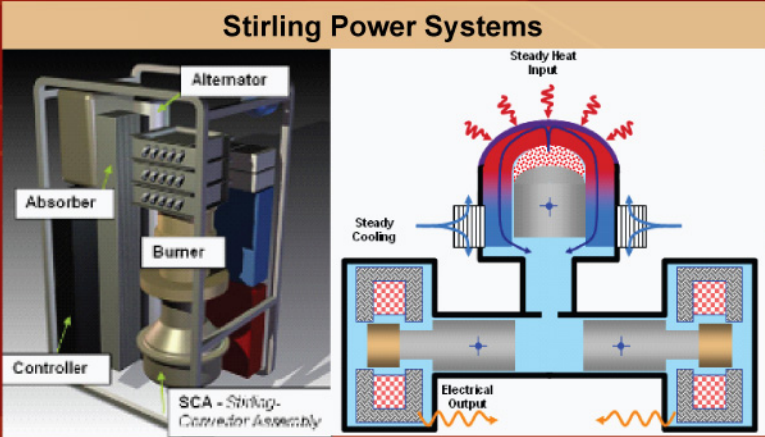


Alternative Power Technology

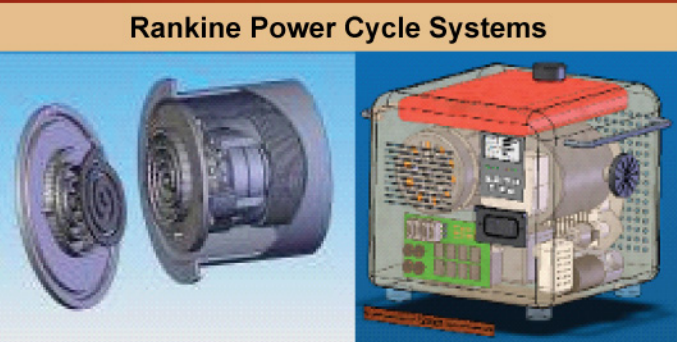


Stirling Engine Benefits:

- Operationally Compatible
- Operates on logistics fuels
- Comparable logistics to internal combustion engines
- Stealth Operation
- Low acoustic signature
- Low vibration and maintenance
- Higher Efficiency
- Use of waste heat stream

Stirling Applications:

- 500W - 2kW Power Systems
- Cogeneration Systems



Power System Based on Steam Rankine Power Cycle that uses a Scroll Expander

Customers Include:

PEO-Soldier	NATICK	DARPA
PEO-CS&CSS	NIGHT VISION	SOCOM
PEO-C3T	OSD-ATL	REF
PM WMD	U.S. EPA	ASTAMIDS
RDECOM		

Capabilities

- Research and Technology Development
- Engineering Consulting and Support
- Analytical Testing:
 - Catalyst Evaluation
 - Reformate Composition Analysis
 - Liquid Fuel Analysis
- Production Engineering
- Specification Development
- Source Selection
- Safety Evaluations
- Life Cycle Cost Analysis
- Testing & Evaluation
 - Developmental T&E
 - First Article T&E
 - Independent Product Evaluation
- Systems Analysis
 - Process Modeling
 - Computational Fluid Dynamics

CERDEC Reformer Test Bed



Contacts

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"Technology to the Warfighter Quicker"

Power Technology Branch

Army Power Division



FORT BELVOIR, VIRGINIA

Mission Statement:

To Lead the Army in the Development and Modeling of Fuel Cell and Alternative Power Technologies for Soldier, APU, and Mobile Systems

Power Technology Branch

Overview



The Power Technology Branch is the Army's premier Power & Energy technology resource for applications and systems.

The Power Technology Branch includes the Power Technology Office as well as the Fuel Cell Technology Team. The Power Technology Office conducts modeling and simulation of power and energy systems as well as research and development of alternative heat engines, direct energy conversion systems, and electromechanical power technologies. The Fuel Cell Technology Team conducts development and evaluation of light-weight, portable fuel cell systems and logistic fuel processing systems for a number of current and future military applications.

The Power Technology Branch supports various Army & DoD Program Management and Product Development Offices by transitioning state of the art technologies for needed capabilities, and leads the Army in the development and modeling of fuel cell and alternative power technologies for soldier, APU, and mobile systems.

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Fuel Cell Technology

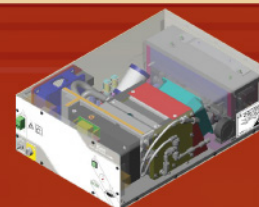
CERDEC Focus Areas

Soldier and Sensor Power (0-100W)



20-W Methanol-Fueled Soldier Fuel Cells

Man-Portable Power (100W-500W)

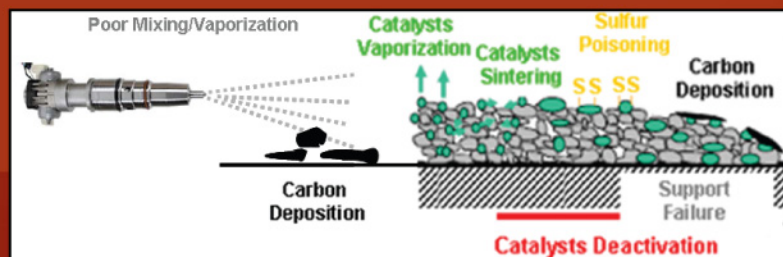


250-W Fuel Cell System for Battery Charging and Stand-Alone Power

Auxiliary Power Units (APU) and Logistics Fuel Processing (500W-10kW)



1 - 5-kWe Logistics-Fueled APUs



Fuel Cell Technology Benefits:

Light-Weight Power

- Decreases burden on Soldier
- Extends mission duration

Stealth Operation

- Low acoustic signature
- Reduced thermal signature

Higher Efficiency

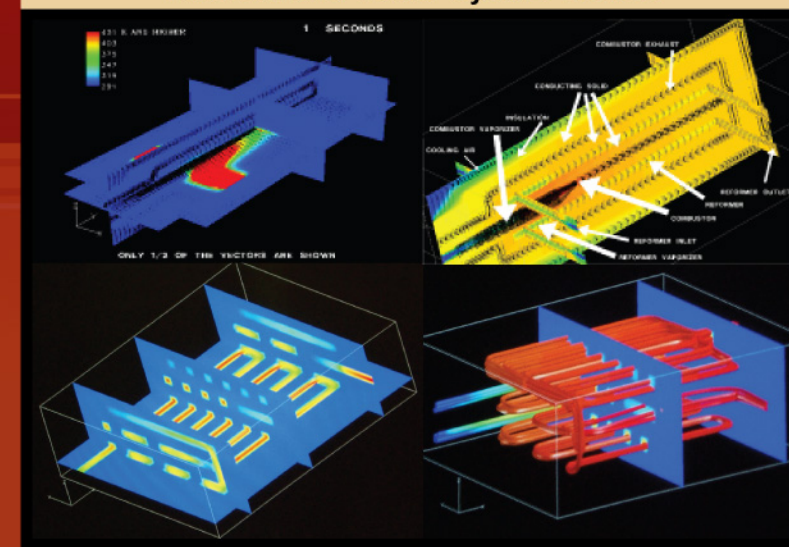
- Improved Fuel Utilization
- Decreased costs over life cycle

Enabling Technologies:

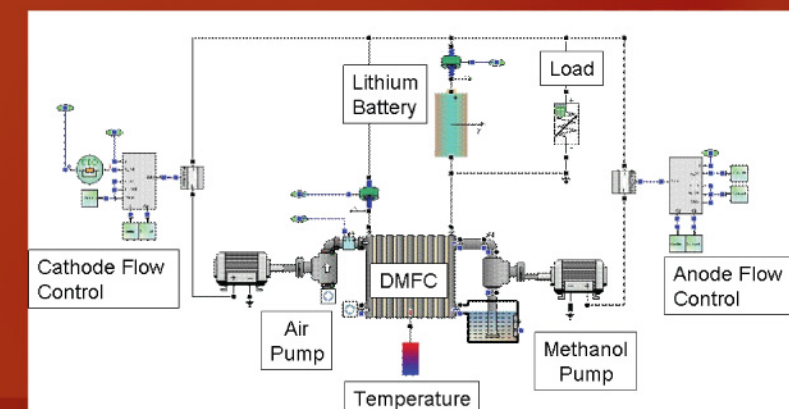
- Reformed Methanol Fuel Cells
- Direct Methanol Fuel Cells
- Proton Exchange Membrane (PEM) Fuel Cells
- Solid Oxide Fuel Cells
- Chemical Hydrides
- Logistics Fuel Processing
- Regenerable Sulfur Removal
- Hydrogen Purification

Modeling and Simulation

Fuel Cell and Power System Models



Computational Fluid Dynamics Models for Combustion & Reactive Flow (Reforming) Reactions



Direct Methanol Fuel Cell / Lithium Battery Hybrid Power Model

Energy System and Safety Models

Species Transport Model of a Vehicle with CO2 Air Conditioning to Simulate Leak

